

THE RANGE OF *PLACOSTYLUS*; A STUDY IN
ANCIENT GEOGRAPHY.

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The genus *Placostylus* appears a more fruitful subject of study than any other molluscan genus inhabiting the same area. Their large and handsome shells have attracted the attention of the most superficial and unscientific collectors; as a result an extensive series of them have been brought to our knowledge from remote localities. Close and attentive scrutiny would scarcely justify an observer in declaring that a particular minute shell did not inhabit any given island, whereas a casual survey would decide whether a conspicuous shell like *Placostylus* did or did not compose a portion of that island's fauna. A larger mass of evidence, both negative and positive, is therefore at our disposal in dealing with *Placostylus* than awaits us in studying smaller species.

The genus ranges from Faro Island, Solomons (*P. founaki*), in the north, to Whangarei, New Zealand (*P. bovinus*), in the south, and from Lanthala, Fijis (*P. morosus*), in the east, to Lord Howe Island (*P. bivaricosus*) in the west; and, so far as is yet known, is distributed as follows:—New Caledonia, 34; Solomons, 16; New Hebrides, 3; Fiji, 16; New Zealand, 1; Lord Howe, 1. The area of distribution of *Placostylus* corresponds generally to that great arc of volcanic activity which stretches across the South-west Pacific from the Solomons through the New Hebrides to New Zealand. On either side of this earth wave extend banks to New Caledonia, Fiji and Lord Howe, indented by abyssal gulfs. This plateau, which for want of a better name I will call the MELANESIAN PLATEAU, is probably circumscribed by the 1300 fathom zone and probably the various archipelagoes upon it are connected by comparatively shallow banks, but the fragmentary knowledge we

yet possess of the contour of the floor of the South Pacific does not enable us to trace its margin.

Eastwards of Fiji, the molluscan fauna indicates the abrupt termination of the Melanesian Plateau. Between the Samoas and Fijis a sounding of 2600 fathoms has been obtained. Significant of this is the absence of *Placostylus* from Savaii, Upolu or Tutuila. The Samoan Islands appear as well fitted as the Fijian to nourish an extensive series of *Placostylus*. They are large, densely wooded, with a warm, moist and equable climate. The distance from their western neighbours is no greater than from the latter to the groups to the westward, and not to be compared to the spaces between New Caledonia and Lord Howe or New Zealand, which have proved no obstacle to the spread of the genus. Yet the Samoas possess a distinctly oceanic mollusc fauna comparable to that of Tahiti, while the mollusc fauna of the Fijis is as distinctly continental.

On the westward we learn from the "Challenger" soundings that about the 20th parallel a bank of a maximum depth of 1300 fathoms connects the Melanesian Plateau with the Great Barrier Reef. This bank was not actually plumbed, but its existence is inferred from the fact that soundings in the Coral Sea diminished in temperature down to 1300 fathoms, and below that level to 2450 fathoms the thermometer readings were stationary. The inrush of cold water from the Antarctic abyss is therefore stopped by banks, whose lowest depth is 1300 fathoms, hemming in the abyss of the Coral Sea. But the canal whose floor is the 1300 fathom level MAY lie, not between the Great Barrier Reef and New Caledonia, but at the head of the gulf between the Loyalties and the New Hebrides.

Wallace, in his "Island Life," advances the theory* that Australia and New Zealand were formerly connected by a bridge of dry land

*"Confining ourselves strictly to the direct relations between the plants of New Zealand and of Australia, I think I may claim to have shown that the union between the two countries in the latter part of the Secondary epoch does sufficiently account for all the main features of the New Zealand Flora"; 2nd Ed. p. 506.

occupying somewhat the position of the Caledonian-Barrier bank. This theory is totally opposed to the distribution of the *Placostylus* in particular and of the Melanesian mollusc-fauna in general. Were it true, then Lord Howe, the furthest western outpost of the Melanesian Plateau, would be tenanted by forms bearing some resemblance to Queensland mollusca. Had the stream of life reached Lord Howe from the north-west instead of from the north-east, then *Placostylus* would have been replaced by *Hadra* and *Chloritis*, while *Pupina* and *Helicina* would have been substituted for *Realia* and *Omphalotropis*.

The various islands inhabited by *Placostylus* would seem to have been joined, if not into one continuous and contemporaneous whole, yet into larger fragments, which, temporarily united, allowed the passage of snails from one tract to another. Should it be proved that the islands occupied by *Placostylus* are now sundered by deeper channels than that between Australia and the Melanesian plateau, even that would not defeat the argument of their former union and of their eternal separation from Australia. Not the depth but the permanence of the ocean is the real limit to the distribution of forms of life. The geology of the Solomon-New Zealand arc, imperfectly as it is yet read, shows a most tempestuous record of lands now sunk in the stillest ocean deeps and anon flung into lofty mountain ranges. The history of the North-East Australian coast exhibits no such vicissitudes, but it appears to have retained its present outline for long ages past. The channel joining the abysses of the Coral and of the Tasman Seas would therefore be more permanent than channels, possibly deeper, intersecting the Melanesian plateau.

The genus *Placostylus* divides itself naturally into halves. The southern portion are inhabitants of New Caledonia, Lord Howe and New Zealand. Almost all are heavy massive shells, dark in colour, confined to the ground by the mere weight of the shell and singularly unfitted to cross distant seas by any means that I can imagine. The northern portion are usually tree dwellers, the shell of a light structure and sometimes brilliantly coloured. Between New Zealand and Fiji a line of soundings has been

recorded of over 2000 fathoms, while between New Caledonia and the New Hebrides two soundings of 2650 and of 2525 fathoms would indicate that a gulf running south-east from the Coral Sea here intervenes. The differences between the northern and southern types of *Placostylus* are supplemented by other features of their respective mollusc faunas. The northern type is everywhere accompanied by *Trochomorpha*, which is never associated with the southern. Species of the so-called *Melanopsis* occur in New Zealand and in New Caledonia, but are unknown in the northern archipelagoes. These scanty data appear to show that early in the history of the existing fauna the Melanesian plateau was rent in twain and has never since been united.

The forms of *Placostylus* inhabiting the Fijis resemble in shape and colour sundry of the Solomon Island species. Thus *elobatus* from Levuka and *christovalensis* from San Christoval are much alike, both in shape and colour-pattern, and *seemanni* from Kandavu finds a close parallel in *macfarlandi* from the Solomons. The remainder of the land mollusca of each archipelago contribute further evidence of affinity, thus *Nanina nitidissima* from the Solomons resembles *N. casca* from Fiji; both areas also possess a *Pupina*. Such affinity would warrant the deduction that the Solomons were the source of the Fijian molluscan fauna; though the former group had probably not then received from Papua the newer genera of *Chloritis* and *Papuina*. Eastwards from the Melanesian plateau *Placostylus* was unable to extend its range; but its derivative and representative *Partula*, together with other Melanesian emigrants, *Endodonta*, *Tornatellina*, *Helicina*, and similar minute forms, drifting eastwards from island to island, colonised the oceanic groups of the south-east Pacific.

Summary.—I would remark, firstly, on the essential unity of the *Placostylus* area as a zoological province, embracing the archipelagoes of Solomon, Fiji, New Hebrides, Loyalty, New Caledonia, Norfolk I. (?), Lord Howe and New Zealand; a unity explicable only on the theory that they form portions of a

shattered continent and are connected by shallow banks formerly dry land. This continental area I propose to call the Melanesian plateau. Secondly, that this Melanesian plateau was never connected with, nor populated from Australia ; probably its fauna was derived from Papua via New Britain. The presence of genera common to Australia and New Zealand is explicable on the ground that they migrated, not from the one territory to the other, but each from a common source, New Guinea. Thirdly, that New Zealand and New Caledonia were early separated from the northern archipelagoes and ceased to receive overland immigrants therefrom. Fourthly, that the Fijis remained to a later date in communication with the Solomons, but were severed from that group before the latter had acquired from Papua much of its present fauna.